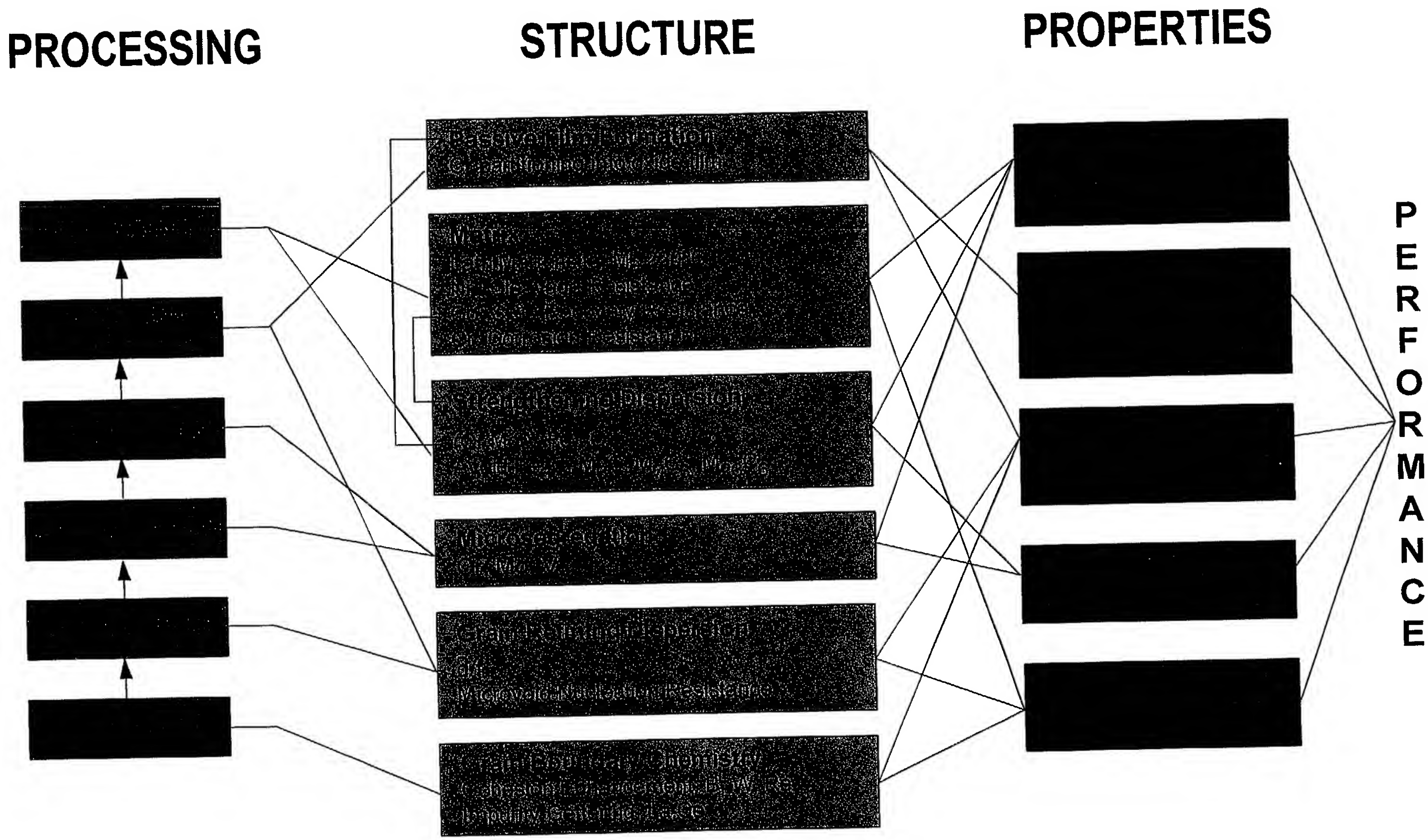

FIG. 1 FLOW-BLOCK DIAGRAM THAT CHARACTERIZES THE DESIGN CONCEPTS OF THE ALLOYS OF THE INVENTION

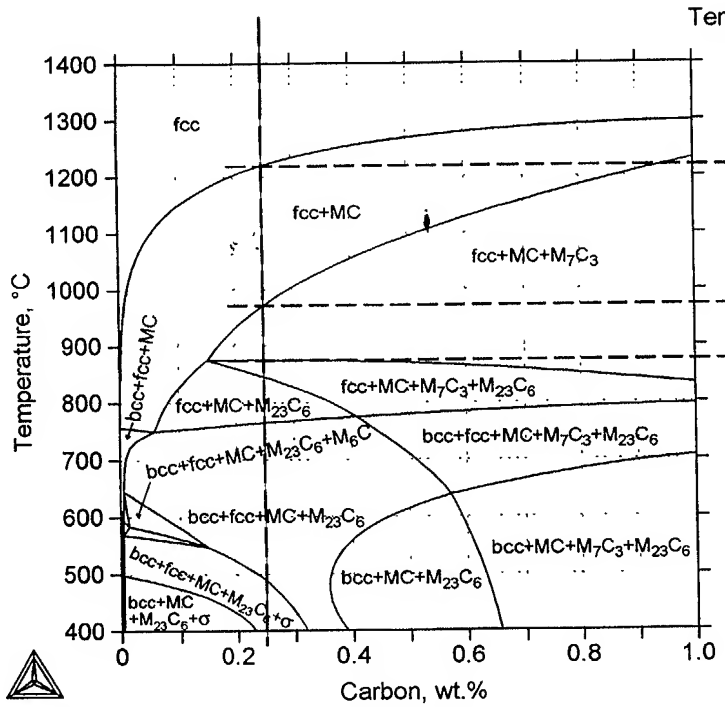

FIG. 2A AN EQUILIBRIUM PHASE DIAGRAM DEPICTING THE PHASE AND COMPOSITION OF PHASES AT VARIOUS TEMPERATURES IN EXAMPLE ALLOY 2C OF THE INVENTION.

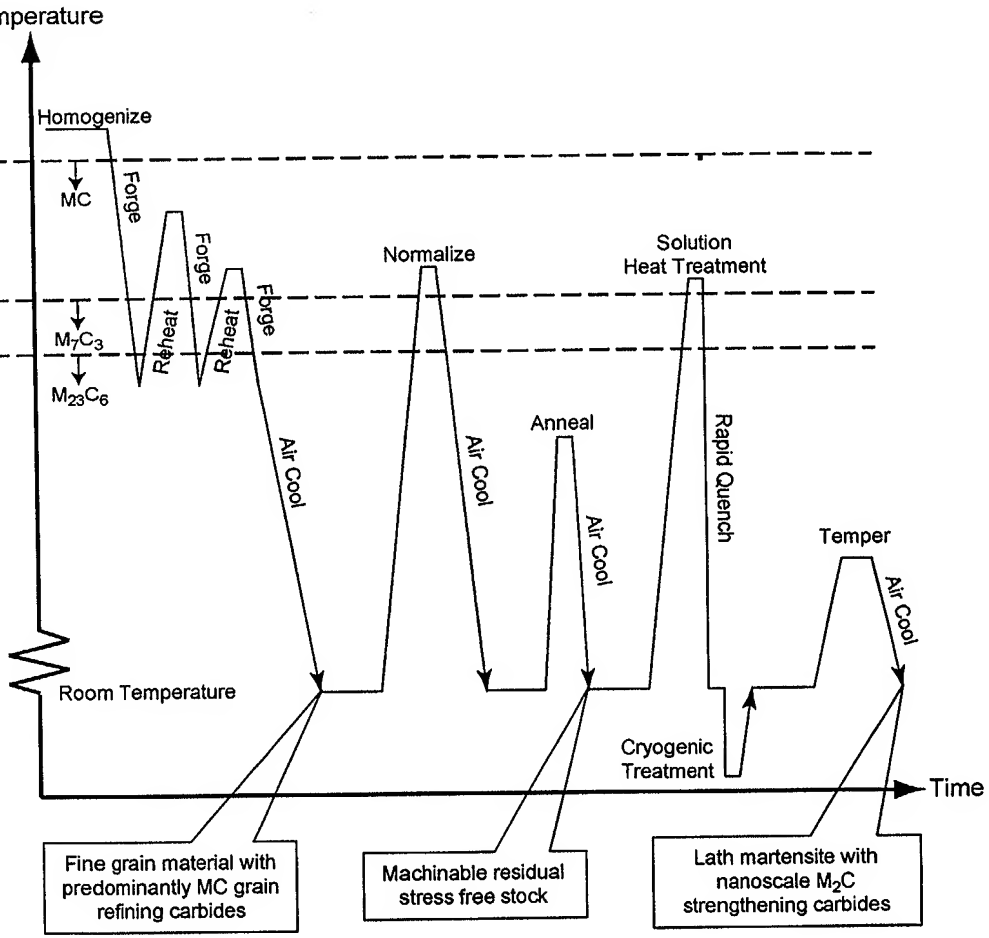

FIG. 2B A DIAGRAM OF THE TYPICAL PROCESSING PATH FOR ALLOYS OF THE INVENTION IN RELATION TO THE EQUILIBRIUM PHASES PRESENT.

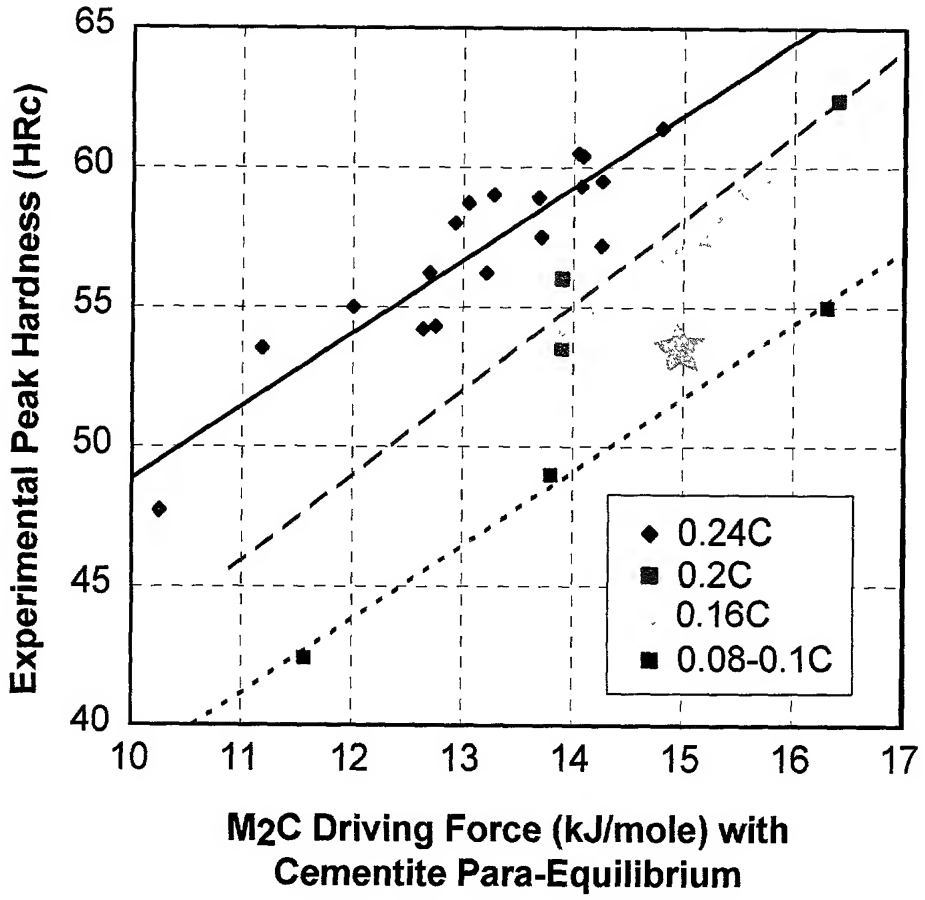

FIG. 3 CORRELATION BETWEEN PEAK HARDNESS AND M_2C DRIVING FORCES FOR VARYING CARBON (C) CONTENT.

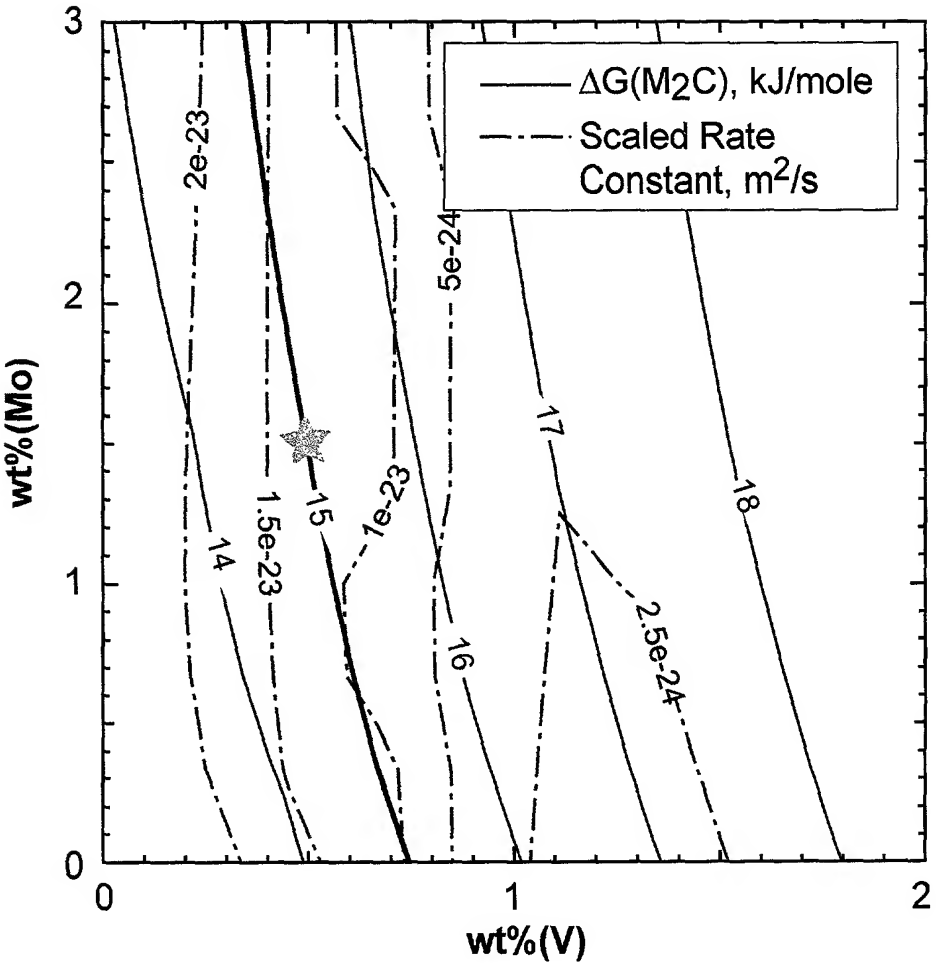

FIG. 4 CONTOURS OF M_2C DRIVING FORCE (ΔG) AND SCALED RATE CONSTANT FOR VARYING MOLBDENUM (Mo) AND VANADIUM (V) CONTENTS, WHERE TEMPERATURE HAS BEEN SET TO 482°C, AND AMOUNTS OF OTHER ALLOYING ELEMENTS HAVE BEEN SET TO, BY WEIGHT, 0.14% C, 9% Cr, 13% Co, AND 4.8% Ni.

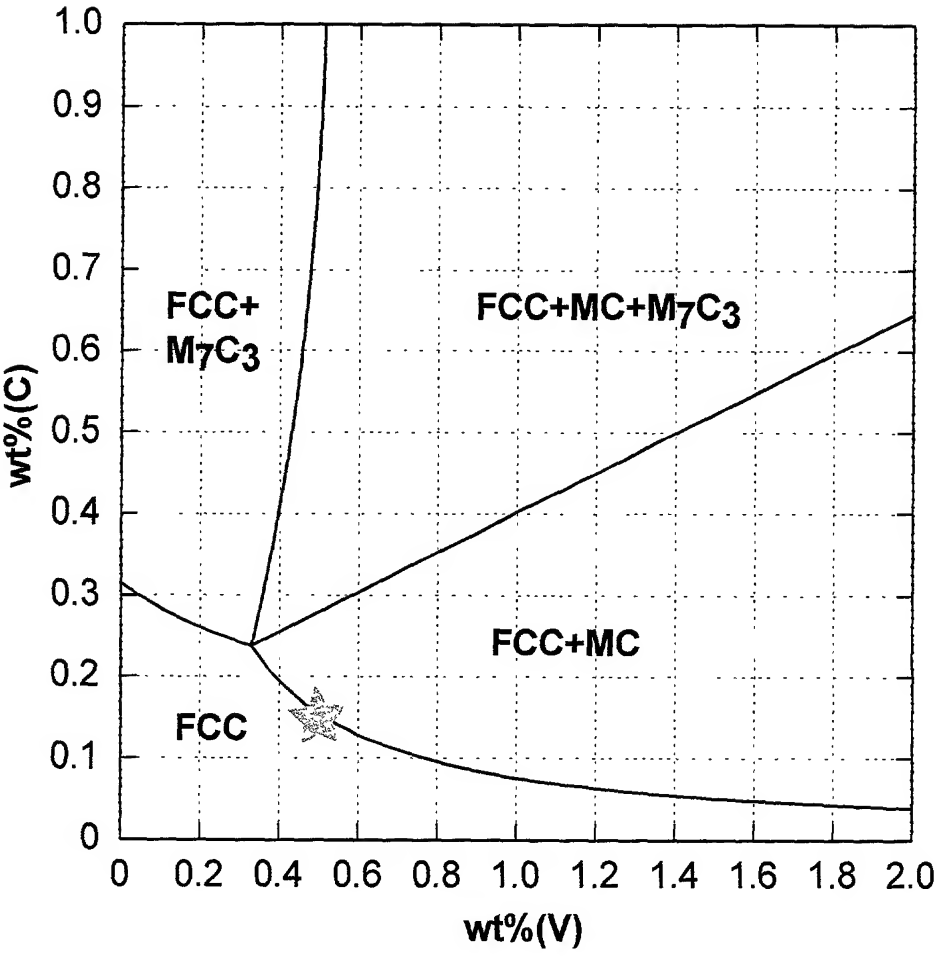

FIG. 5 PHASE DIAGRAM AT 1000°C USED TO DETERMINE FINAL VANADIUM (V) CONTENT FOR A CARBON (C) CONTENT OF 0.14% BY WEIGHT, WHERE OTHER ALLOYING ELEMENTS HAVE BEEN SET TO, BY WEIGHT, 9% Cr, 1.5% Mo, 13% Co, AND 4.8% Ni.

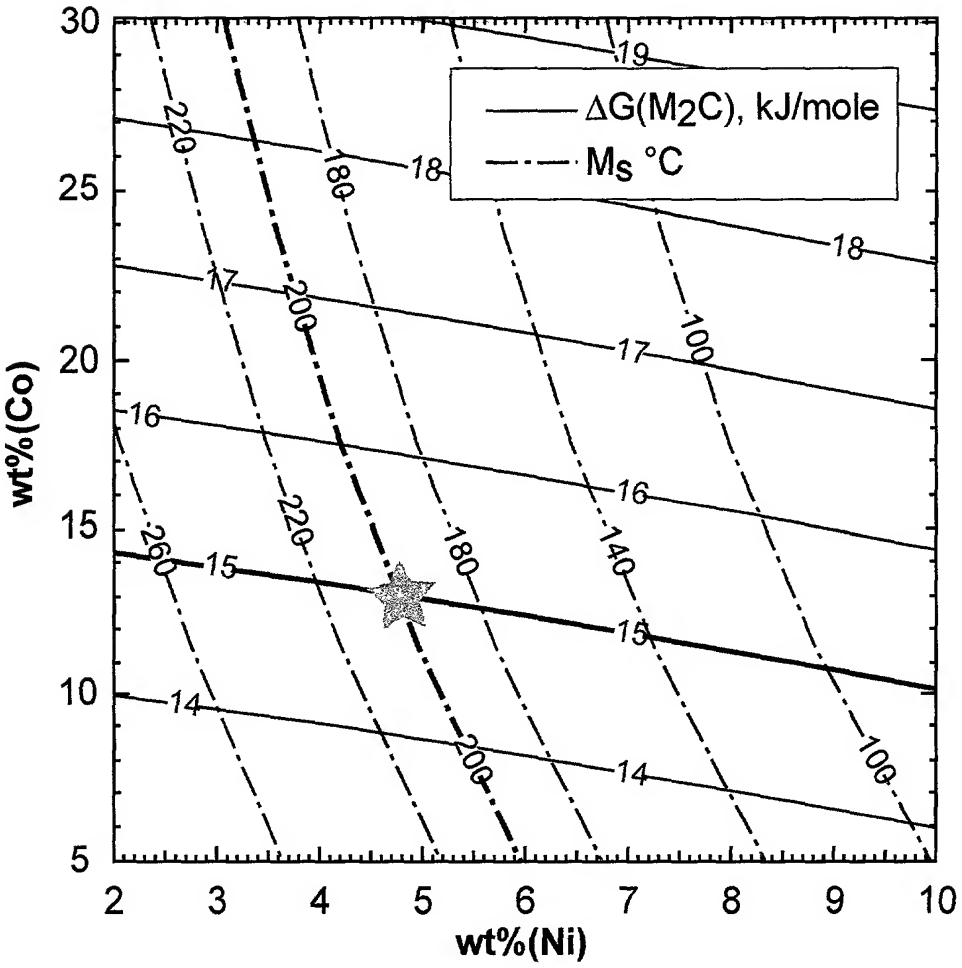

FIG. 6 CONTOURS OF M_S TEMPERATURE AND M_2C DRIVING FORCE (ΔG) FOR VARYING COBALT (Co) AND NICKEL (Ni) CONTENTS, WHERE TEMPERATURE HAS BEEN SET TO 482°C, AND OTHER ALLOYING ELEMENT AMOUNTS HAVE BEEN SET TO, BY WEIGHT, 0.14% C, 9% Cr, 1.5% Mo, AND 0.5% V.

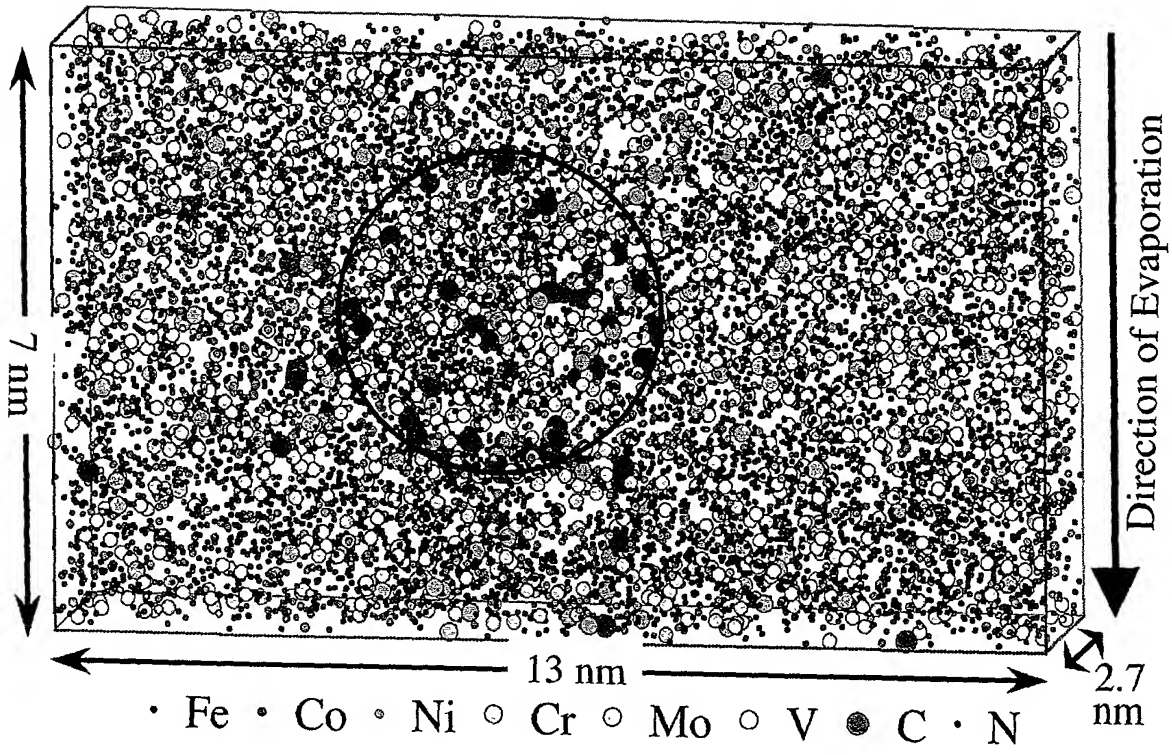

FIG. 7 3-DIMENSIONAL ATOM-PROBE IMAGE OF AN M_2C CARBIDE OPTIMALLY HEAT TREATED TO 3 nm DIAMETER IN EXAMPLE ALLOY 2C.